PALEONTOLOGY.—*Descriptions of a new genus and a new species of Carboniferous brachiopods.*[1] GEORGE H. GIRTY, U. S. Geological Survey.

The contribution to paleontologic literature which follows is so insignificant that I venture a few words of explanation or perhaps of apology.

The privilege was recently given to me of sharing in the re-description and re-illustration of the Paleozoic species treated by Roemer in his *Kreidebildung von Texas*. One of these (*Productus flemingi* Roemer von Sowerby) proved to be an undescribed species of *Marginifera* to which I gave the name *Marginifera roemeri*.[2] Now it was clearly in the interest of American Paleontology to base the species not upon Roemer's specimens, but upon specimens in my own collections which could be consulted by other paleontologists of this country. At the same time it was not consonant with the project in hand to describe or figure any specimens other than Roemer's own. Consequently, *Marginifera roemeri* has remained up to now a *nomen nudum* and it seemed desirable to remove it from that status as soon as possible.

Regarding the genus *Anopliopsis* little need be said. The description might well have awaited publication in a proper setting except that I wished to refer to the genus soon in a different connection. The genus is based upon a species which has been in the literature for several years as *Chonetina subcarinata* Girty.[3] The type specimens came from the Ridgetop shale and Fort Payne formation of western Tennessee and it may be of interest to recall that *A. subcarinata* has several times been identified as a species of *Ambocoelia*, a not unpardonable error inasmuch as ventral valves with their small size, high convexity and smooth surface strongly suggest the ventral valve of that genus.

Marginifera roemeri, n. sp. Figs. 1–5

Productus flemingii. Roemer von Sowerby, Kreidebildung von Texas, p. 89, pl. 11, figs. 8a, b, 1852. Carboniferous: San Saba Valley, Texas.

Ventral valve small, strongly transverse, widest at the hinge, hemispherical. The curvature is irregular longitudinally; the highest part of the valve is posterior to the middle and the curvature is somewhat stronger at that point than it is before or behind it. Umbonal region rather inflated. Auricles large and somewhat abruptly extended. Anterior slope with a sinus, which may be rather strong, extending backward to or onto the visceral disc.

Surface marked by radial costae which are fairly high and separated by rounded striae. The costae are rather coarse for the size of the shell. The

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[2] GIRTY, GEORGE H. U. S. Geol. Survey Prof. Paper **186-M**: 264. 1937.

[3] GIRTY, GEORGE H. U. S. Geol. Survey Prof. Paper **146**: 27. 1926.

distance from crest to crest is commonly 1 mm and about 6 costae, also from crest to crest, come within a space of 5 millimeters. This number may be increased by 2 or 3 if the measurement is taken where some of the full-sized costae have divided to form smaller ones. The visceral disc is marked by concentric corrugations which vary in character in different specimens. They may be rather numerous, strong and regular, or on the other hand rather weak and unequal. The entire surface is crossed also by strong, fine, incremental lines. Spines are fairly large but not numerous and they are without any noticeable differential arrangement. They form neither a distinct row along the hinge-line, as in many species, nor a distinct tuft on the auricles as in others.

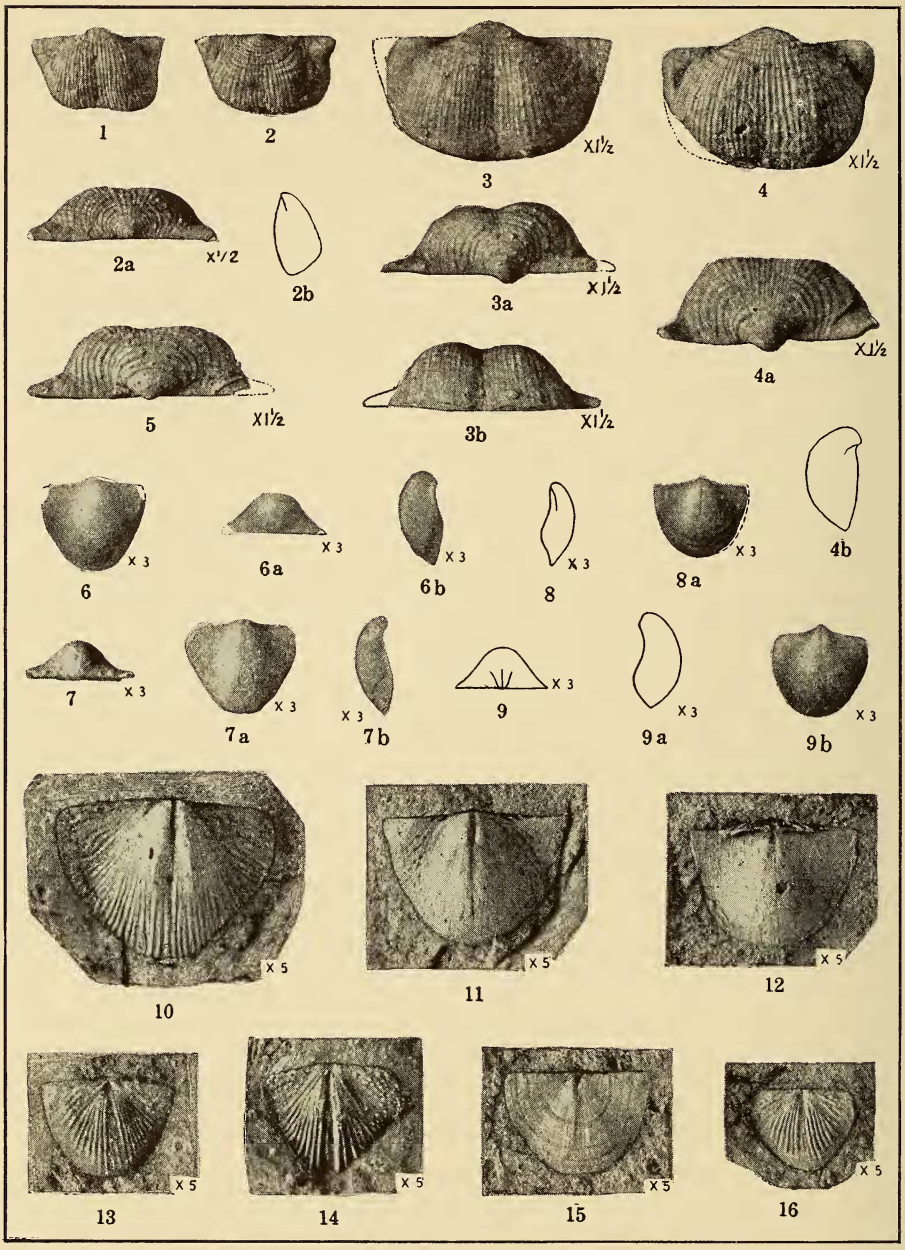
The dorsal valve, viewed as a convex object, is much less curved than the ventral valve. It consists of an extensive visceral disc and a short tail, which are in effect almost perpendicular to each other. They are gently convex and are connected by a much stronger curve. The other characters of this valve correspond to those of the ventral valve except that the surface appears to be without spines.

"*Marginifera*" structures are present, but in a rather feeble stage of development.

At first glance this species might be mistaken for *Marginifera muricatina*, somewhat more finely striated perhaps, but not materially different. If compared with characteristic specimens of that species, however, the difference in striation is conspicuous and other differences almost equally marked appear. The spines on the ventral valve of *M. roemeri* are larger and much less numerous. The dorsal valve is quasi-geniculate instead of being rather regularly concave and it is apparently devoid of spines, whereas small spines are fairly well sprinkled over the dorsal valve of *M. muricatina*. *M. roemeri* is really more closely comparable to *M. wabashensis*. Now in order to avoid creating numerous and impracticable species, *M. wabashensis* has been made to comprise a rather wide range of forms and it is difficult to select one of these as more typical than another or to name differences that will hold for all. Generally, however, it may be said that *M. roemeri* is a relatively broader species with a less convex ventral valve. The sinus is apt to be deeper than that of *M. wabashensis*, and the corrugations of the visceral disc stronger. The radial costae are also, as a rule, stronger, rising higher from wider striae. The differences last mentioned may not be so very constant, but the characters involved are found more strongly expressed in *M. roemeri* and in numerous specimens. There is one other detail which seems to be both fairly constant and not unimportant. In *M. wabashensis* there is commonly to be seen a row of spine bases passing obliquely from the beak to the lateral margins low down on each side of the vault. The spines are graduated in size, the final ones being very large. No feature really comparable to this has been observed in *M. roemeri*, though something of the sort appears sporadically.

This is the species which Roemer discussed and figured as *Productus flemingii*[4] Sowerby. There can be no doubt on this head, as I have compared my specimens with Roemer's, and as they come from the same general locality, and occur in the same faunal association. Bibliographers have commonly classed Roemer's form in the *Marginifera splendens-Wabashensis* series. Schuchert, for instance, places it under *Productus longispina* along with *M. splendens* and *M. wabashensis*. Weller also places it under *P. longispina* along with *M. splendens* but gives *M. wabashensis* separate recognition.

[4] ROEMER, FERDINAND. *Kreidebildung von Texas*, p. 89, pl. 11, figs. 8a, 8b. 1852. See also, GIRTY, GEORGE H. Geol. Survey Prof. Paper 186-M: 264. 1937.



Figs. 1–5.—*Marginifera roemeri*, n. sp. Fig. 1. A ventral valve with unbroken auriculations. Figs. 2, 2a, 2b. Three views of a dorsal valve preserved as an external mold partly covered by shell. Fig. 2a is enlarged $\times 1\frac{1}{2}$. Figs. 3, 3a, 3b. Three views of a large ventral valve, all $\times 1\frac{1}{2}$. Figs. 4, 4a, 4b. Three views of another ventral valve, all $\times 1\frac{1}{2}$ except fig. 4b. Fig. 5. Posterior view of a ventral valve, $\times 1\frac{1}{2}$. All the figured specimens of *Marginifera roemeri* came from the Smithwick shale (?), 11 miles west of San Saba, Texas (station 2602). (Legend continued on opposite page.)

As just stated, *M. roemeri* appears to find its nearest relative in *M. wabashensis;* it is widely unlike *M. splendens.*

Horizon and locality.—Smithwick shale (?), San Saba quadrangle, just south of highway eleven miles west of San Saba Courthouse, Texas (station 2602).

Anopliopsis, n. gen. Figs. 6–16

This genus may be summarily described as a small chonetid which has a highly arched ventral valve without a sinus and is superficially marked only by incremental lines without radial striation. Internally the ventral valve has a long and fairly strong septum; the brachial valve is covered as to the median part by a number of relatively high, thin radiating plates and as to the lateral parts by spinules.

The internal structure of the brachial valve is thought to be the main distinguishing feature of the genus. The configuration and surface characters may also prove to be diagnostic but to what extent will rest largely upon congeneric species when any are discovered. As a brief statement of its relations, *Anopliopsis* is distinguished from *Anoplia* by the presence of cardinal spines wherein it is exactly like *Chonetes.* It is distinguished from *Chonetes* by having the spinules on the interior of the brachial valve replaced over the median region by vertical plates, much as in *Chonetina.* It is distinguished from *Chonetina* by being smooth instead of striated and by having the pedicle valve strongly convex on the median line instead of deflected inward to form a deep sinus.

Genotype.—Anopliopsis subcarinata Girty.

The species which is here made the basis of a new genus was originally described under *Chonetina* Krotow.[5] The departure from that assignment does not mark so complete a reversal of opinion as it might appear to do for the reference to *Chonetina* was more or less qualified and the new genus is not proposed without some reservations.

Chonetina subcarinata was described in connection with a small fauna of Boone age from San Saba County, Texas, but the description was based upon specimens from the Ridgetop shale and the Fort Payne formation, in

[5] GIRTY, GEORGE H. U. S. Geol. Survey Prof. Paper **146**: 27, pl. 5, figs. 10a–16. 1926. By oversight the generic heading is *Chonetes* but the species is described as *Chonetina subcarinata.*

Figs. 6–16.—*Anopliopsis subcarinata* Girty. Figs. 6, 6a, 6b. Three views of a ventral valve, ×3. Figs. 7, 7a, 7b. Three views of another ventral valve, ×3. Figs. 8, 8a. Two views of another ventral valve, ×3. Figs. 9, 9a, 9b. Three views of a characteristic ventral valve, ×3. Fig. 10. Internal mold of a ventral valve in which the lamellose character is strongly developed, ×5. Fig. 11. Internal mold of a ventral valve in which the same character is faintly developed or poorly preserved, ×5. Fig. 12. External mold of a dorsal valve. The silicified fillings of the cardinal spines of the ventral valve can be seen above, ×5. Figs. 13 and 14. Squeezes made from the internal molds of two dorsal valves, ×5. Fig. 15. External mold of a dorsal valve, ×5. Fig. 16. Like figures 13 and 14, a squeeze made from an internal mold of a dorsal valve, ×5. All the specimens figured came from localities in the Waynesboro quadrangle, Tennessee, and all but the original of fig. 7 (which was collected in the Ridgetop shale) came from the basal part of the Ft. Payne chert. The specimens shown by figs. 6 and 8 came from station 1822; that shown by fig. 7 came from station 1853; those shown by figs. 9 and 14 came from station 1821; that shown by fig. 10 came from station 1830; that shown by fig. 11 came from station 1826; those shown by figs. 12, 13, 15, 16, came from station 1841. Figures 6, 6a, 6b, 8, 8a, 9, 9a, 9b, are the original figures used when the species was published as *Chonetina subcarinata.* In addition to these specimens from Tennessee on which the species was founded there were also figured at that time a specimen from the Moorefield shale of Oklahoma and 3 specimens from rocks of Boone age in Texas.

the Waynesboro quadrangle in western Tennessee; the same species occurs in the Moorefield fauna of northeastern Oklahoma. All three of the figured specimens (figs. 10–12) were ventral valves. As the internal characters of the dorsal valve are so important from a generic standpoint, I propose to figure specimens of that valve, some showing the inner, others the outer surface, and for the convenience of the reader I propose to give a resume of the characters of both valves, so far as known.

Externally the shell in certain respects agrees with *Chonetes* for it is concavo-convex, it has a cardinal area in both valves, and it has cardinal spines issuing from the ventral valve. Internally also it has certain characters in common with *Chonetes*. It is provided with dental plates and sockets and the dorsal valve has a small cardinal process, its outer surface divided by two (?) incisions. The details of this very small structure cannot be given nor has it been ascertained whether it is partly covered by a "cheilidium."

The ventral valve has a fairly long, stout, median septum in the form of a ridge more or less sharp on top but spreading downward to merge by degrees with the contour of the interior. Whether this structure should be called a septum is open to question, for it is rather an angular ridge than a thin plate such as is often designated by that term. The answer to this question would depend upon how a "septum" was defined and whether the wedge-shaped ridge was originally a thin plate which had reached its present shape through depositions of callus along its sides. The septum of *Anopliopsis* does seem to be thin and high at the tip of the beak and is probably something more than a mere accumulation of callus. It differs from the septum of *Chonetes* in length as well as in its shape, the septum in *Chonetes* being a thin plate and present, in this character, only in the umbonal region.

There is, however, a certain lack of agreement among authors regarding the presence of a septum in the valves of *Chonetes*. Hall and Clarke, for instance, credit *Chonetes* with a septum in both valves. Weller does not mention a septum as present in either valve (I mean of course in his generic diagnosis); and the same may be said of Dunbar and Condra, though they, to be sure, were writing of *Chonetes* in a restricted sense. According to my hasty observations, a septum is commonly present in the ventral valve though it is short and perhaps not very high. In the dorsal valve a septum is well developed in some species, especially in those of Pennsylvanian age; in some Mississippian species, on the other hand, I have been unable to recognize such a structure at all. In the dorsal valve of *Anopliopsis* there are several low ridges or lamellae in the median part but no real median septum.

Like *Chonetes*, again, the inner surface of the ventral valve is covered by numerous spinules arranged in radiating rows. In appearance, at least, specimens differ considerably in this regard. The internal mold (fig. 10) is partly covered by radial ridges (too completely covered in the figure) but the ridges themselves are spinose on top and are replaced by rows of spines laterally. The internal mold (fig. 11) is almost smooth, with distinct spinules only at the sides.

The ventral valve has also cardinal spines which, as in *Chonetes*, project from the angle at the upper margin of the cardinal area. The spines are of course very small and it has not been practicable to show them adequately in the illustrations. They are, in fact, broken off in most specimens though their presence is amply established. They are mostly recognized by the scars or minute perforations which they make along the upper margin of the cardinal area. This evidence, even if there was nothing more tangible would demonstrate a difference from *Anoplia* in which the homologous struc-

tures are few and do not pass completely through the shell substance.

The interior of the dorsal valve is covered as to the lateral parts with spinules, but over the median part these are replaced by continuous lamellae that have a definite and constant arrangement. The lamellae (which theoretically may be regarded as consolidated spines though actually they are thin plates and are not serrated on top) are confined to the median half of the valve, or to the more strongly arched portion, and they are divided into two groups by a relatively wide space down the middle with 6 or 7 lamellae in each group. The median space is unoccupied except as it may contain in the anterior half several lamellae which are short and conspicuously lower than the lamellae on either side. The spinules that replace the lamellae farther out on the auricles are rather large and are radially arranged. The longest and highest lamellae are those adjacent to the median area and the more lateral ones are partly replaced by spinules.

A discussion of the relationship of *Anopliopsis* to *Chonetes* and *Chonetina* is attended by some complexity because the old genus *Chonetes* has been broken up and the new genera created from the fragments have not all been distinguished on the same set of characters and have not been interpreted in the same way or given the same values by all authors.

From *Chonetes* in the broad sense *Anopliopsis* is distinguished by its internal characters especially by the thin high plates developed on the surface of the dorsal valve. In addition to this general difference, it differs from some of the chonetid "genera" in being smooth instead of striated or in being regularly arched without a fold or sinus, or in both ways, characters which have been employed for the disintegration of *Chonetes*.

Anopliopsis shows a striking resemblance to *Chonetina* in the internal characters of the dorsal valve, the characters on which Krotow relied to distinguish *Chonetina* from *Chonetes*, but it shows striking differences in every other character for it is smooth instead of striated, it is regularly arched instead of deflected into a strong fold and sinus, it was developed at the beginning of the Carboniferous period instead of toward its end, and its habitat was in the opposite hemisphere. It is true, of course, that Dunbar and Condra have referred several American species to *Chonetina* but I can see no substantial reason either why those species were distinguished from *Chonetes* s. s. or why they were included under *Chonetina*.

A consideration of *Anopliopsis* in its relation to *Anoplia* was suggested to me by G. A. Cooper, for I had overlooked that genus in canvassing the generic affinities of *A. subcarinata*. In external appearance *Anopliopsis* and *Anoplia* are much alike and each is a monotypic genus. *Anopliopsis* is a true chonetid with cardinal spines like all the rest of the tribe. *Anoplia* as described by Hall and Clarke, on the other hand, has a peculiar structure which may be compared to a single cardinal spine on each side which penetrated the cardinal area but did not reach the surface and of whose presence there is no external evidence. The absence of true cardinal spines in *Anoplia* is confirmed by Dr. Cooper from numerous excellent specimens in the National Museum. He notes points of resemblance between *Anoplia* and *Anopliopsis* in the internal structure (*Anoplia* seems to have similar but less numerous ridges in the brachial valve). He remarks also that the time relations of *Anopliopsis* would suggest a genetic affinity to the Devonian genus *Anoplia* rather than to the Permian *Chonetina*, an opinion in which all must agree (fide his letter of April 10, 1935).

As stated in the beginning, *Anopliopsis* is not proposed as a new genus without some reservations. It is possible that with increased knowledge the

internal differences upon which *Anopliopsis* mainly rests will be bridged so that no satisfactory line of demarcation will be found between *Anopliopsis* and *Chonetes*. This possibility is suggested by a little known species described by Stevens as *Chonetes Michiganensis*. In its external appearance *C. Michiganensis* could be called a normal species of *Chonetes* s. s. It is a large shell, it is not highly arched, and it is marked by irregular, feeble, but quite distinguishable costae. Its internal characters, however, are analogous to those of *A. subcarinata* except that the radial plates are not so high and are obviously compacted of spinules possibly through deposits of callus. Although *Anopliopsis* is endowed with strong individuality by reason of its combination of size, configuration, and sculpture, aside from its internal characters, the fact just mentioned suggests that in its internal characters it may grade into *Chonetes*.

On the other hand, the distinction between *Anopliopsis* and *Chonetina* so far as can be determined, rests mainly upon differences in configuration and sculpture emphasized by differences in time and place of occurrence. Future discoveries may bring to light species constructed like *Anopliopsis* and *Chonetina* which are intermediate in geologic time and are gradational in shape and ornamentation.

ZOOLOGY.—*A new copepod from Japanese oysters transplanted to the Pacific coast of the United States.*[1]

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A few years ago some of the large Japanese oysters were transplanted to the Pacific coast of the United States and have thriven well in their new environment. During the past year some of them have been found to be infested with a copepod and specimens have been sent to the present author for identification. These specimens included both sexes and have proved to be a new species, a description and figures of which are here presented.

Mytilicola ostreae, n. sp.

Occurrence.—The copepods are found attached to the inner wall of the stomach of the oyster. There are usually but two or three specimens on one host but as many as twenty have been taken from a single oyster, in which case a considerable portion of the stomach cavity was occupied by them.

Female.—Body elongate, narrow and tapered posteriorly; head separated from the thorax, wider than long, with a small dorsal carapace which is divided longitudinally through its center. The five thoracic segments and the genital segment completely fused, with no indication of separation except the paired dorsal processes. Each thoracic segment bears a pair of these processes near its posterior corners. Each process is triangular in shape and extends diagonally outward and backward, with an acute tip which sometimes curves slightly forward. The first four pairs of processes increase in size posteriorly, the fifth pair are smaller than the fourth. The genital seg-

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